cooperation with a lead screw mechanism, moves the distributor hook 506 from the extended position shown in FIGURES 13 and 15, to the retracted position shown in FIGURE 14, the motor 514 and threaded shaft 516 constituting elements of a preferred hook member drive assembly. Stepper motor 514 is preferably a modified HSI, series 46000. HSI stepper motors are available from Haydon Switch and Instrument, Inc. of Waterbury, Connecticut. The HSI motor is modified by machining the threads off one end of the threaded shaft 516, so that the shaft 516 can receive the hook mounting structure 508.

The housing 504, motor 514, and the plate 512 are preferably covered by a conforming shroud 507.

As shown in FIGURE 16, a stepper motor 518 turns a pulley 520 via a belt 519. (VEXTA stepper motors, model number PK264-01A, available from Oriental Motor Co., Ltd. of Tokyo, Japan, and SDP timing belts, model number A6R51M200060, available from SDP/SI of New Hyde Park, New York, are preferred). Pulley 520 is preferably a custom-made pulley with one hundred sixty-two (162) axial grooves disposed around its perimeter. A main shaft 522 fixedly attached to the plate 512, by means of a uniquely-shaped mounting block 523, extends down through a base 524 and is fixed to the pulley 520. Base 524 is mounted to the datum plate 82 by means of mechanical fasteners extending through apertures 525 formed about the outer periphery of the base 524. A flex circuit 526 provides power and control signals to the hook mounting structure 508 and motor 514, while allowing the plate 512 (and the components carried on the plate) to pivot sufficiently so as to rotate as much as 340° with respect to the base 524. The transport mechanism 500, 502, assembly preferably includes hard stops (not shown) at either end of the unit's rotational path of travel.

An arm position encoder 531 is preferably mounted on an end of the main shaft 522. The arm position encoder is preferably an absolute encoder. A2 series encoders from U.S. Digital in Seattle, Washington, model number A2-S-K-315-H, are preferred.

The assay manager program provides control signals to the motors 518 and 514, and to the hook mounting structure 508, to command the distributor hook 506 to engage the MTU manipulating structure 166 on MTU 160. With the hook 506 engaged, the motor 514 can be energized to rotate the shaft 516 and thereby withdraw the hook 506, and the MTU 160, back into the housing 504. The MTU 160 is securely held by the transport mechanism 500, 502 via the sliding engagement of the connecting rib structure 164 of the MTU 160 with opposed edges 511 of plate 512 adjacent slot 510. The plate 512 thereby constitutes an element of a preferred

receptacle carrier assembly that is constructed and arranged to be rotatable about an axis of rotation (e.g., the axis of shaft 522) and to receive and carry a reaction receptacle (e.g., MTU 160). The motor 518 can rotate the pulley 520 and shaft 522 via the belt 519 to thereby rotate the plate 512 and housing 504 with respect to the base 524. Rotation of the housing 504 thus changes the orientation of the engaged MTU, thereby bringing that MTU into alignment with a different station on the processing deck.

Sensors 528, 532 are provided in opposite sides of the housing 504 to indicate the position of the distributor hook 506 within the housing 504. Sensor 528 is an end-of-travel sensor, and sensor 532 is a home sensor. Sensors 528, 532 are preferably optical slotted sensors available from Optek Technology, Inc. of Carrollton, Texas, model number OPB980T11. For the home sensor 532, the sensor beam is broken by a home flag 536 extending from the hook mounting structure 508 when the hook 506 is in its fully retracted position. The beam of the end-of-travel sensor 528 is broken by an end-of-travel flag 534 extending from the opposite side of the hook mounting structure 508 when the hook 506 is fully extended.

An MTU-present sensor 530 mounted in the side of the housing 504 senses the presence of an MTU 160 in the housing 504. Sensor 530 is preferably a SUNX, infra-red sensor, available from SUNX/Ramco Electric, Inc., of West Des Moines, Iowa.

TEMPERATURE RAMPING STATIONS

One or more temperature ramping stations 700 are preferably disposed below the jig plate 130 and specimen ring 250 (no temperature ramping stations located below the specimen ring 250 are shown in the figures). After mixing the contents of the MTU 160 within the orbital mixer 550, the right-side transport mechanism 500 may move the MTU 160 from the right orbital mixer 550 to a temperature ramping station 700, depending on the assay protocol.

The purpose of each ramping station 700 is to adjust the temperature of an MTU 160 and its contents up or down as desired. The temperature of the MTU and its contents may be adjusted to approximate an incubator temperature before inserting the MTU into the incubator to avoid large temperature fluctuations within the incubator.

As shown in FIGURES 17-18, a temperature ramping station 700 includes a housing 702 in which an MTU 160 can be inserted. The housing 702 includes mounting flanges 712, 714 for mounting the ramping station 700 to the datum plate 82. A thermoelectric module 704 (also known as a Peltier device) in thermal contact with a heat sink structure 706 is attached to the

housing 702, preferably at the bottom 710. Preferred thermoelectric modules are those available from Melcor, Inc. of Trenton, New Jersey, model number CP1.4-127-06L. Although one thermoelectric module 704 is shown in FIGURE 17, the ramping station 700 preferably includes two such thermoelectric modules. Alternatively, the outer surface of the housing 702 could be covered with a mylar film resistive heating foil material (not shown) for heating the ramping station. Suitable mylar film heating foils are etched foils available from Minco Products, Inc. of Minneapolis, Minnesota and from Heatron, Inc. of Leavenworth, Kansas. For ramp-up stations (i.e., heaters), resistive heating elements are preferably used, and for ramp-down stations (i.e., chillers), thermoelectric modules 704 are preferably used. The housing 702 is preferably covered with a thermal insulating jacket structure (not shown).

The heat sink structure used in conjunction with the thermoelectric module 704 preferably comprises an aluminum block with heat dissipating fins 708 extending therefrom.

Two thermal sensors (not shown) (preferably thermistors rated 10 KOhm at 25°C) are preferably provided at a location on or within the housing 702 to monitor the temperature. YSI 44036 series thermistors available from YSI, Inc. of Yellow Springs, Ohio are preferred. YSI thermistors are preferred because of their high accuracy and the ±0.1°C interchangeability provided by YSI thermistors from one thermistor to another. One of the thermal sensors is for primary temperature control, that is, it sends signals to the embedded controller for controlling temperature within the ramping station, and the other thermal sensor is for monitoring ramping station temperature as a back-up check of the primary temperature control thermal sensor. The embedded controller monitors the thermal sensors and controls the heating foils or the thermoelectric module of the ramping station to maintain a generally uniform, desired temperature within the ramping station 700.

An MTU 160 can be inserted into the housing, supported on the MTU support flanges 718 which engage the connecting rib structure 164 of the MTU 160. A cut-out 720 is formed in a front edge of a side panel of the housing 702. The cut-out 720 permits a distributor hook 506 of a transport mechanism 500 or 502 to engage or disengage the MTU manipulating structure 166 of an MTU 160 inserted all the way into a temperature ramping station 700 by lateral movement with respect thereto.